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Gary D Clapp Esq
66 Blanford Place
Bedford, NH 03110

EXAMINER

MASKULINSKI, MICHAEL C

ART UNIT PAPER NUMBER

2113

DATE MAILED: 01/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/579,670

Applicant(s)

DE FOREST ET AL.

Examiner

Michael C Maskulinski

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Final Office Action

Claim Objections

1. In view of the recent claim amendments the objection to claim 11 has been withdrawn.

Claim Rejections - 35 USC § 102

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1, 3, 5, 9, 11, 13, and 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Rastogi et al., U.S. Patent 6,205,449.

Referring to claims 1, 3, 5, 9, 11, 13, and 15:

- a. In column 3, lines 8-21 and in Figure 1, Rastogi et al. teach a storage sub-system and a first and second control/processing sub-systems, each including a file system processor performing file transaction operations in response to client requests directed to the first and second control/processing sub-systems and controlling file storage operations of the storage sub-system. Further, in column 3, lines 11-12, Rastogi et al. teach that the first and second control/processing sub-systems operating concurrently and in parallel.
- b. In column 3, lines 23-47 and in Figure 1, Rastogi et al. teach a state machine logging mechanism operating concurrently and cooperative with the file system processor.

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- c. In column 3, lines 23-57, Rastogi et al. teach a state machine log generator for extracting state machine information defining at least one state machine during an execution of an operation, the at least one state machine representing a current state of execution of a file transaction of the corresponding control/processing sub-system.
- d. In column 3, lines 22-27, Rastogi et al. teach that the control/processing sub-system is a state machine system defined during execution of an operation by at least one sequential state machine defined by a state of operation of the state machine system during a step in the execution of the operation, and wherein a file transaction operation is represented by at least one sequential state machine wherein each state machine is defined by data and control values residing in the state machine system during existence of state machine of the sequence).
- e. Although, Rastogi et al. don't explicitly teach a state machine that is comprised of state information including control and data values representing a state of operation of the control/processing sub-system at a given time, having state information including control and data values is inherent to the system of Rastogi et al. This is evident in column 3, lines 11-12 where Rastogi et al. disclose a secondary system, which is run in parallel with a primary system. Further, in column 3, lines 36-42, Rastogi et al. disclose that the second system is synchronized with the primary system, for example, via log records communicated through the network from the primary system to the secondary

system, and is thus available to take over processing immediately is the primary system fails or is disconnected. As can be seen the second system has to know the control and data values in order to immediately takeover for the primary system.

f. In column 3, lines 35-61, Rastogi et al. teach that the log generator is responsive to the restoration of operation after a failure of the corresponding control/processing sub-system for reading the information from the log and restoring the state of execution of a file transaction of the corresponding control/processing sub-system.

Claim Rejections - 35 USC § 103

4. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

5. Claims 2, 4, 6, 8, 10, 12, 14, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rastogi et al., U.S. Patent 6,205,449, and further in view of Kandasamy et al., U.S. Patent 5,513,314.

Referring to claims 2, 4, 6, 8, 10, 12, 14, and 16, Rastogi et al. teach a back-up mechanism responsive to the restoration of operation of the other control/processing sub-system after a failure of the other control/processing subsystem for reading the information from the log back-up mechanism to the other control/processing sub-system (see column 3, line 48 through column 4, line 59). However Rastogi et al. don't explicitly teach that the back-up is receiving and storing mirror copies of the state

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machine information concurrently and in parallel with the state machine log. In column 6, lines 4-21, Kandasamy et al. disclose that the secondary file server concurrently performs all file creation type NFS operations and NFS data update operations requested by any client workstations. It would have been obvious to one of ordinary skill at the time of the invention to include the concurrent backup of Kandasamy et al. into the system of Rastogi et al. A person of ordinary skill in the art would have been motivated to make the modification because it provides the advantage that failover between a mutually fault tolerance protected server systems is relatively instantaneous (see Kandasamy et al.: column 3, lines 31-36).

Response to Arguments

6. Applicant's arguments filed September 13, 2004 have been fully considered but they are not persuasive.

7. On page 14, under the section REMARKS, the Applicant states, "a "state machine" is therefore comprised of and is defined and described as a sequence of one or more state machines wherein each state machine in the sequence of state machines is defined by the current state at that point in time." Since this is integral to the Applicant's arguments, the Examiner would like to note that this is incorrect. A state machine cannot be composed of other state machines. A state machine can be comprised of other states but not other state machines. To show this, the Examiner has attached an excerpt from Logic and Computer Design Fundamentals, by Mano and

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Kime. The cited section shows that a state machine consists of a sequence of states not state machines.

8. On pages 15-16, under the section REMARKS, the Applicant argues, "A conventional logging operation for a system operation may thereby be thought of as a system capturing a "snap-shot" of the minimum information required to define an operation, that is, the instruction, request or command initiating the operation and the data operated upon in the operation. For example, at column 8, lines 3-15, Rastogi et al. '449 defines a "transaction" as being comprised of a sequence of operations at some level in the system and states that the Rastogi et al. '449 system records "transactions". As such, and by Rastogi et al. '449's own statement, the Rastogi et al. '449 system does not record or restore the intermediate sub-operations within an "transaction". The Examiner respectfully disagrees. In column 8, lines 24-36, Rastogi et al. disclose that the recovery algorithm maintains a separate undo log and redo log in main memory for each transaction.

9. On page 16, under the section REMARKS, the Applicant argues, "The present invention, however, provides a mechanism for logging and mirroring each of the sub-operations of the sequence of sub-operations comprising a given operation of the system by recording each sub-operation as a state machine, that is, as the machine state of a state machine, of a sequence of state machines representing or modeling the operation of the system." The Examiner would like to note that this limitation doesn't appear anywhere in the claims.

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10. On pages 19-20, under the section REMARKS, the Applicant argues, "In this regard, it must be noted that in the systems of the present invention, and in fundamental contrast from the typical form of "back-up" systems as taught by, for example, Rastogi et al. '449, the full processing power of the two control/processing sub-systems is available at all times to process requests from clients. If one control/processing sub-system fails, the other control/processing sub-system continues operative to perform the request directed to it and to maintain the state machine information necessary to subsequently restore the failed control-processing sub-system." The Examiner finds this to be irrelevant since this limitation doesn't appear anywhere in the claims.

11. On page 22, under the section REMARKS, the Applicant argues, "in complete and fundamental contrast from Rastogi et al. '449, the system of the present invention captures and stores state machines representing the detailed operation of the system in the execution of each transaction and stores these state machines while the corresponding transaction is being executed, so that the execution of a transaction may be continued or resumed at any time, not just at the end or beginning of a transaction." The Examiner would like to note that this is verbatim from the response submitted by the Applicant on April 12, 2004. The Examiner respectfully requests that the Applicant not give the same argument over again since it isn't helpful in the prosecution of the Application. The Examiner respectfully disagrees. In column 10, lines 52-61, Rastogi et al. disclose that once all the redo log records have been applied, the active transactions are rolled back. To do this, all completed operations that have been invoked directly by

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the transaction, or have been directly invoked by an incomplete operation have to be rolled back. In other words, the current state of a transaction is maintained.

12. On page 23, under the section REMARKS, the Applicant argues, "In fundamental contrast from Rastogi et al. '449, the system of the present invention captures and records and mirrors each sub-operation in an operation as a state machine and as and when each sub-operation is executed, so that a transaction or operation is continuously recorded at each sub-operation point as the transaction or operation is executed."

Further, the Applicant argues, "The Rastogi et al. '449 system cannot and does not provide this level of capture and mirroring and can capture and restore only completed transactions. The Examiner would like to note that the limitation that the Applicant relies on does not appear in the claims. There aren't any sub-operations claimed, nor is there any mention of the transactions being continuously logged. Rather, the claim language states, "a state machine is comprised of state information including control and data values representing a state of operation of the control/processing sub-system at a given time." This could be interpreted as only be done once. The Examiner respectfully disagrees. There is a transaction record constantly being maintained. It is then later transferred to mass storage. Further, in column 10, lines 52-61, Rastogi et al. disclose rolling back active transactions.

13. On page 23, under the section REMARKS, the Applicant argues, "In further fundamental contrast from the present invention, it must be noted that the transaction records captured by Rastogi et al. '449, that is the data comprising a record of a completed transaction that is captured by Rastogi et al. '449, has no relationship to a

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state machine representing the control and data values present in a state machine system and representing the operating state of a system of operation at a given time.”

The Examiner respectfully disagrees for at least the reasons above and because in column 8, lines 24-25, Rastogi et al. disclose keeping a separate undo log and redo log for each transaction.

14. On page 24, under the section REMARKS, the Applicant argues, “Rastogi et al. ‘449 essentially only describes representing a transaction in the primary system transaction log in terms of what are in fact the instructions or commands initiating each operation at each level, and perhaps any data input to the operation. At no point does Rastogi et al. ‘449 describe or even mention a ‘state machine system’, a ‘state machine’, system ‘state’ as represented by the control and data values residing in the system at a given point during the execution of a transaction and defining the ‘state machine’ of the system at that point.” The Examiner would like to note that this is verbatim from the response submitted by the Applicant on April 12, 2004. The Examiner respectfully requests that the Applicant not give the same argument over again since it isn’t helpful in the prosecution of the Application. The Examiner respectfully disagrees. Again the Applicant fails to give specific columns and lines where Rastogi et al. teach or disclose this. Further, the Applicant acknowledges that Rastogi et al. do disclose control and data values by admitting that the transaction log represents instructions or commands (control values) and perhaps any data input to the operation (data values) at each level.

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15. On page 25, under the section REMARKS, the Applicant argues, "A conventional system such as that taught by Rastogi et al. '449, however, may well miss such information from a preceding sub-operation or step within an operation as the log stores only the current instruction or command and input data fro the operation as a whole or the data resulting from completion of the operation as a whole, and does not store data or information for the sub-operations or steps within the operation." The Examiner respectfully disagrees. It is clearly and explicitly disclosed by Rastogi et al. that for every transaction a redo and undo log is kept. How can a redo be done on a transaction without the sub-operations? The Examiner refers the Applicant to column 8, lines 24-44.

16. On pages 25-26, under the section REMARKS, the Applicant states, "The Rastogi et al. '449 system, therefore cannot and does not capture or record the sub-operations within a transaction and thus cannot restore a transaction any sub-operation within the execution of the transaction, but instead captures only the beginning or end of a transaction. It is for these reasons that the Rastogi et al. '449 system contains both a "redo" log, so that a transaction can be re-executed from the start, and an "undo" log, so that a transaction can be "undone", or canceled, by "undoing" the transaction." The Examiner respectfully disagrees. Contrary to Applicant's belief, in column 8, lines 37-44, Rastogi et al. disclose that there are sub-operations in the undo log. Further, the Examiner would greatly appreciate it if the Applicant specifically pointed out where it is taught by Rastogi et al. that only the beginning or end of a transaction is stored.

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Without adequate support the Examiner believes that this is merely an assumption made by the Applicant.

17. On page 26, under the section REMARKS, the Applicant argues, "It is noted, in this regard that Rastogi et al. '449 does not in fact state that a log entry contains information taken during the execution of the transaction, but only that the stored information includes only the information essential to reconstruction of the transaction as an entity." The Examiner respectfully disagrees. The information taken during the execution of the transaction is the same as the stored information essential to reconstruction. It is unclear as to how they differ. During a transaction operations are performed and recorded. These operations are essential to reconstruction.

18. On page 27, under the section REMARKS, the Applicant argues, "Rastogi et al. '449 does not even mention restoring or resuming a transaction at any of the sub-operations comprising the transaction, but only redoing or undoing a transaction. The Examiner respectfully disagrees and refers the Applicant to column 10, lines 52-61. Further, this argument is irrelevant since this limitation does not appear anywhere in the claims.

19. On page 29, under the section, REMARKS, the Applicant argues, "Finally, and in further distinction between the present invention and the teachings of Rastogi et al. '449, it must be noted that the primary and secondary computer systems of the Rastogi et al. '449 system do not correspond either structurally or functionally with the dual control/processing sub-systems of the present invention. That is and as described, for example, in Rastogi et al. '449 at column 3, line 8 through column 4, line 2, the two

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computer systems of the Rastogi et al. '449 system are not parallel, cooperating sub-systems within a system, but are completely and separate computer systems." The Examiner would like to note that this is verbatim from the response submitted by the Applicant on April 12, 2004. The Examiner respectfully requests that the Applicant not give the same argument over again since it isn't helpful in the prosecution of the Application unless the Applicant sheds new light on the subject. The Examiner respectfully disagrees. In column 3, lines 11-12, Rastogi et al. explicitly disclose that a "hot spare" is a secondary system, which is run in **parallel** with a primary system. If the Applicant is attempting to claim that the two sub-systems are operating at the same time so that the full processing power of the two control/processing sub-systems is typically available at all time to process requests from clients, the Examiner draws the Applicant's attention to Hemphill et al., U.S. Patent 5,781,716 where that is taught.

20. On pages 29-30, under the section REMARKS, the Applicant argues, "the primary and secondary computer systems of the Rastogi et al. '449 system do not correspond either structurally or functionally with the state machine logging mechanism and state machine log mirroring mechanism of the present invention as each of the primary and secondary computer systems of the Rastogi et al. '449 system are a full function, general purpose computer capable of performing both transaction operations and transaction logging. In contrast, the state machine logging mechanism and state machine log mirroring mechanism of the present invention are both dedicated purpose, specialized function mechanisms that are structurally and functionally different from one another and are directed to separate and distinctly different functions." The Examiner

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would like to note that this is verbatim from the response submitted by the Applicant on April 12, 2004. The Examiner respectfully requests that the Applicant not give the same argument over again since it isn't helpful in the prosecution of the Application unless the Applicant sheds new light on the subject. The Examiner respectfully disagrees. This argument has been addressed in paragraph 7 of the Final Office Action, paper no. 9, mailed January 12, 2004. The Examiner's response can be found there.

21. On page 29, under the section REMARKS, the Applicant argues, "a control/processing sub-system and its associated state machine logging mechanism with the associated state machine logging mechanism with the associated state machine log mirroring mechanism cannot be compared, structurally or functionally, with the primary and secondary computer systems of the Rastogi et al. '449 system because the primary and secondary computer systems of the Rastogi et al. '449 system are in fact identical but completely separate and independent systems from one another. In contrast, the state machine log mirroring mechanism is functionally an integral element of the corresponding state machine logging mechanism, even though the state machine log mirroring system resides separately from the state machine logging mechanism so as not to be involved in a failure of the corresponding control/processing sub-system with which the state machine log generator and log reside." The Examiner would like to note that this is verbatim from the response submitted by the Applicant on April 12, 2004. The Examiner respectfully requests that the Applicant not give the same argument over again since it isn't helpful in the prosecution of the Application unless the Applicant sheds new light on the subject. The Examiner respectfully disagrees. This

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argument has been addressed in paragraph 8 of the Final Office Action, paper no. 9, mailed January 12, 2004. The Examiner's response can be found there.

22. On pages 31-32, under the section REMARKS, the Applicant argues, "the Kandasamy et al. '314 system is in basic contrast from the present invention because the Kandasamy et al. '314 system does not and cannot capture and record the sub-operations comprising the data transfer requests, but instead captures and records data transfer requests only as entities." The Examiner respectfully disagrees. Kandasamy et al. disclose that the transactions between the systems are concurrent, therefore, sub-operations would be captured.

23. On pages 32-33, under the section REMARKS, the Applicant argues that the system of Kandasamy et al. has a packet structure and that each data transfer request is a self-contained and complete operation rather than a sequence of sub-operations of unknown length. This is merely an assumption made by the Applicant. The Examiner requests that the Applicant specifically show how the system of Kandasamy et al. does this. Further, the Applicant states that Kandasamy et al. '314 consistently refers to data transfer requests as self-contained entities and consistently describes each data transfer request as being comprised of a request and the associated data, which comprises a complete operation in itself. The Examiner respectfully disagrees. The Examiner has examined the sections of Kandasamy et al. cited by the Applicant and has not found anything indicating that the transactions are self-contained entities. It appears that it is merely an assumption being made by the Applicant.

24. On page 34, under the section REMARKS, the Applicant argues, "The system of the present invention is thereby fundamentally distinguished from the teachings of Kandasamy et al. '314 in that the control/processing sub-systems of the present invention operate concurrently and in parallel at all times rather than for only certain specific operations." The Examiner doesn't understand the relevance of this statement. The fact that Kandasamy et al. has a parallel mode is sufficient to reject the Applicant's limitation.

25. On page 34, under the section REMARKS, the Applicant argues, "the dual control/processing sub-systems of the present invention operate concurrently with one another, but independently of one another with each control/processing sub-system executing only the requests for transactions or operations that are directed to it, so that the full processing power of the two control/processing sub-systems is typically available at all times to process requests from clients." The Examiner will not address this argument since this limitation doesn't appear anywhere in the claims and therefore has no relevance. The claims only mention one sub-system. The dual sub-system has not been claimed.

26. On pages 35-36, under the section REMARKS with respect to the Applicant's arguments that the combination of Rastogi et al. and Kandasamy et al. is invalid. The Examiner respectfully disagrees. The system of Kandasamy et al. is an obvious improvement over Rastogi et al. because an advantage of Kandasamy et al. is that failover between a mutually fault tolerance protected server systems is relatively instantaneous (see Kandasamy et al.: column 3, lines 31-36). One of ordinary skill in

the art would be motivated to make the combination because it would be beneficial to the system of Rastogi et al. Computer technology is always based upon what was done and how it can be improved.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael C Maskulinski whose telephone number is (571) 272-3649. The examiner can normally be reached on Monday-Friday 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert W Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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MM


ROBERT BEAUSOLIEL
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100